A. INTRODUCTION

This section deals with the problem of neutron interaction between subcritical units of an array or system. Many methods have been developed to cope with this most difficult problem and some of the more useful of these are reviewed or referenced here. Several actual sample calculations have been made using critical array experiments. An examination of these results will show that there is no one good method for interaction problems. Indeed, one method may yield safe results for one system and unsafe results for another system. Due to this uncertainty of results, the size of an array calculated by these methods should be used as a design guide only. Firm design would require clearance by a Criticality Specialist.

Neutron interaction must always be considered when fissile material is present except:

1. Where fissile units are separated by one foot of water or a material of equivalent hydrogen density.

2. Where the units are separated or shielded by another unit whose interaction has already been calculated.

3. Where all units combined constitute a safe mass or less.

4. Where all units are made up of homogeneous mixtures with the fissile isotope concentration less than 6 grams per liter.

The following array criteria is specified in Section I.C:

1. The individual units must be safe.

2. The array shall have a k_{eff} less than 0.98 for the worst foreseeable conditions.

3. Generally, the units should be separated by 12 inches to give isolation in case of water flooding.

4. Shipping containers and arrays must meet the requirements of Chapter 0529 of the U. S. Atomic Energy Commission manual; 10CFR71 and the Department of Transportation Regulations, 49CFR173.